Topical Fire Report Series

December 2018 | Volume 19, Issue 9

Cooking Fires in Residential Buildings (2014-2016)

These topical reports are designed to explore facets of the U.S. fire problem as depicted through data collected in the U.S. Fire Administration's National Fire Incident Reporting System. Each topical report briefly addresses the nature of the specific fire or fire-related topic, highlights important findings from the data, and may suggest other resources to consider for further information. Also included are recent examples of fire incidents that demonstrate some of the issues addressed in the report or that put the report topic in context.

Findings

- Each year, from 2014 to 2016, fire departments in the United States responded to an estimated average of 188,800 cooking fires in residential buildings. These fires caused an estimated annual average of 195 deaths, 3,800 injuries and $463 million in property loss.
- Cooking was, by far, the leading cause of all residential building fires and injuries.
- Cooking fires in residential buildings occurred most frequently in the late afternoon and evening hours from 4 to 9 p.m., accounting for 40 percent of the fires. Fires peaked from 5 to 8 p.m. when many people were preparing the evening meal.
- Residential building cooking fires peaked in November at 9 percent and declined to the lowest point during July and August.
- Confined fires, those fires involving the contents of a cooking vessel without fire extension beyond the vessel, accounted for 91 percent of residential building cooking fires.
- Oil, fat and grease (47 percent) were the leading types of material ignited in nonconfined cooking fires in residential buildings.
- In 83 percent of nonconfined cooking fires in residential buildings, the fires were limited to the object or room of fire origin.
- The leading specific factor contributing to ignition in nonconfined cooking fires in residential buildings was unattended equipment (40 percent).
- Smoke alarms were present in 67 percent of nonconfined cooking fires in occupied residential buildings. Additionally, automatic extinguishing systems (AES) were present in only 8 percent of nonconfined cooking fires in occupied residential buildings.

Each year, from 2014 to 2016, fire departments responded to an estimated average of 188,800 cooking fires in residential buildings across the nation. These fires resulted in an annual average of 195 deaths, 3,800 injuries and $463 million in property loss.[1,2,3] The term "cooking fires" includes those fires that were caused by stoves, ovens, fixed and portable warming units, deep fat fryers, and open grills, as well as those fires that are confined to the cooking vessel.[4]

From 2014 to 2016, cooking was, by far, the leading cause of all residential building fires and accounted for 50 percent of all residential building fires responded to by fire departments across the nation.[5] Additionally, cooking was the leading cause of all residential building fire injuries.[6] Annual estimates of residential building cooking fires and their associated losses for 2014 to 2016 are presented in Table 1.

FEMA

U.S. Fire Administration
Working for a fire-safe America

National Fire Data Center
16825 S. Seton Ave.
Emmitsburg, MD 21727
https://www.usfa.fema.gov/data/statistics/

Table 1. National estimates of residential building cooking fires and losses by year (2014-2016)

Year	Residential building cooking fires	Residential building cooking fire deaths	Residential building cooking fire injuries	Residential building cooking fire dollar loss
2014	189,800	250	4,125	$553,900,000
2015	193,400	165	3,775	$501,100,000
2016	183,300	170	3,475	$335,400,000

Sources: National Fire Incident Reporting System (NFIRS) 5.0, residential structure fire-loss estimates from the National Fire Protection Association's (NFPA's) annual surveys of fire loss, and U.S. Fire Administration's (USFA's) residential building fire loss estimates.

Notes: 1. Fires are rounded to the nearest 100, deaths to the nearest five, injuries to the nearest 25, and loss to the nearest hundred thousand dollars.
2. The 2014 and 2015 dollar-loss values were adjusted to 2016 dollars.

This topical report addresses the characteristics of residential building cooking fires as reported to the NFIRS from 2014 to 2016.[7] For the purpose of this report, the term "residential cooking fires" is synonymous with "residential building cooking fires," as residential cooking fires commonly mean those fires caused by cooking that occur in buildings. "Residential cooking fires" is used throughout the body of this report; the findings, tables, charts, headings and endnotes reflect the full category, "residential building cooking fires."

Type of fire

Building fires are divided into two classes of severity in the NFIRS: "confined fires" and "nonconfined fires." Confined building fires are small fire incidents that are limited in extent to specific types of equipment or objects, staying within pots, fireplaces or certain other noncombustible containers.[8] Confined fires rarely result in serious injury or large content loss and are expected to have no significant accompanying property loss due to flame damage.[9] Nonconfined fires extend beyond certain types of equipment or objects. They are generally larger fires resulting in more serious injury and larger losses of property and content.

Of the two classes of severity, confined fires accounted for 91 percent of residential cooking fires (Table 2). The larger, nonconfined fires accounted for the remaining 9 percent of residential cooking fires. By comparison, from 2014 to 2016, 50 percent of all residential building fires were confined fires.

Table 2. Residential building cooking fires by type of incident (2014-2016)

Incident Type	Percent
Nonconfined fires	9.4
Confined fires	90.6
Total	100.0

Source: NFIRS 5.0.

Loss measures

Table 3 presents losses, averaged over the three-year period from 2014 to 2016, for residential cooking fires and all other residential building fires (i.e., excluding cooking fires) reported to NFIRS.[10] The average loss of fatalities, injuries and dollar loss for residential cooking fires was substantially less than those for all other residential building fires. This most likely is attributed to the fact that 91 percent of residential cooking fires are confined fires that result in little or no loss. As can be expected, the average losses associated with nonconfined residential cooking fires were notably high since nonconfined fires generally are large fires resulting in serious injury and large content losses.

Table 3. Loss measures for residential building cooking fires (three-year average, 2014-2016)

Measure	Residential building cooking fires	Confined residential building cooking fires	Nonconfined residential building cooking fires	Residential building fires (excluding cooking fires)
Average loss:				
Fatalities/1,000 fires	0.5	0.0	5.4	6.8
Injuries/1,000 fires	15.1	7.7	85.7	31.3
Dollar loss/fire	$1,840	$190	$17,740	$25,700

Source: NFIRS 5.0.

Notes: 1. No deaths in confined fires were reported to the NFIRS from 2014 to 2016; the resulting loss of 0.0 fatalities per 1,000 fires reflects only data reported to the NFIRS.

2. Average loss for fatalities and injuries is computed per 1,000 fires; average dollar loss is computed **per fire** and is rounded to the nearest $10.

3. The 2014 and 2015 dollar-loss values were adjusted to 2016 dollars.

4. The category "Residential Building Fires (Excluding Cooking Fires)" does not include fires of unknown cause.

Property use

Table 4 presents the percentage distribution of residential cooking fires by property use (i.e., one- and two-family residential buildings, multifamily residential buildings, and all other residential buildings).[11] Cooking fires were almost evenly distributed between one- and two-family residences and multifamily residences. Multifamily dwellings accounted for 46 percent of residential cooking fires and one- and two-family residences accounted for an additional 46 percent of residential cooking fires. By contrast, one- and two-family residences represented 64 percent of all residential building fires, and multifamily dwellings accounted for 29 percent of residential fires for the same period.

Table 4. Residential building cooking fires by property use (2014-2016)

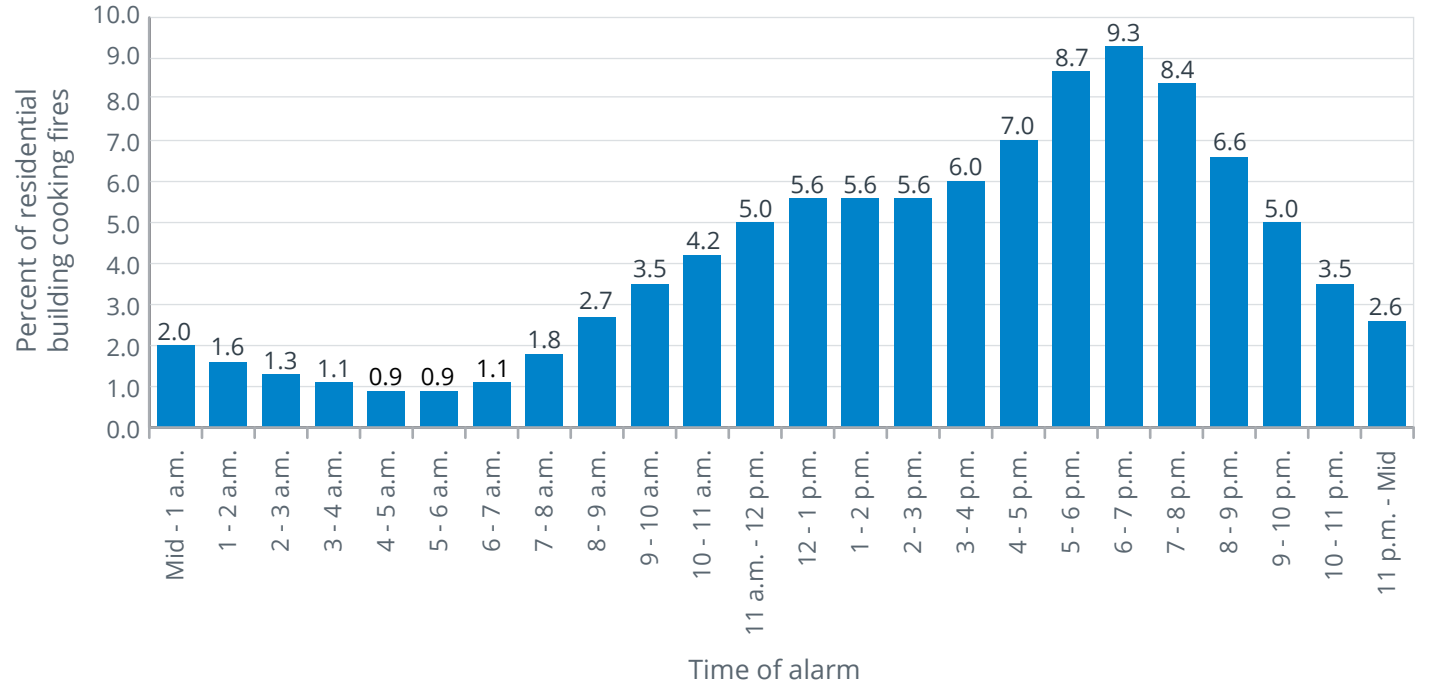
Property Use	Percent of fires
Multifamily residential buildings	46.1
One- and two-family residential buildings	45.5
Other residential buildings	2.6
Dormitory-type residences	1.8
Boarding/Rooming houses	1.4
Hotels and motels	1.2
Residential board and care, excludes nursing homes	1.0
Barracks	0.3
Sorority and fraternity houses	0.1
Total	100.0

Source: NFIRS 5.0.

When residential building cooking fires occur

As shown in Figure 1, residential cooking fires occurred mainly in the late afternoon and evening hours from 4 to 9 p.m., peaking from 5 to 8 p.m. when many people were preparing the evening meal.[12] This three-hour peak period accounted for 26 percent of the fires. Residential cooking fires declined throughout the night and early morning and reached their lowest point during the morning hours from 4 to 6 a.m. Fires then steadily increased and plateaued over the lunch hours from noon to 3 p.m. The five-hour period from 4 to 9 p.m. accounted for 40 percent of all residential cooking fires, and the two-hour morning period from 4 to 6 a.m. accounted for nearly 2 percent. Small confined cooking fires dominated the alarm profile and produced the pronounced peaks and valleys; the number of larger, nonconfined fires, grouped by time of alarm, was only slightly less variable.

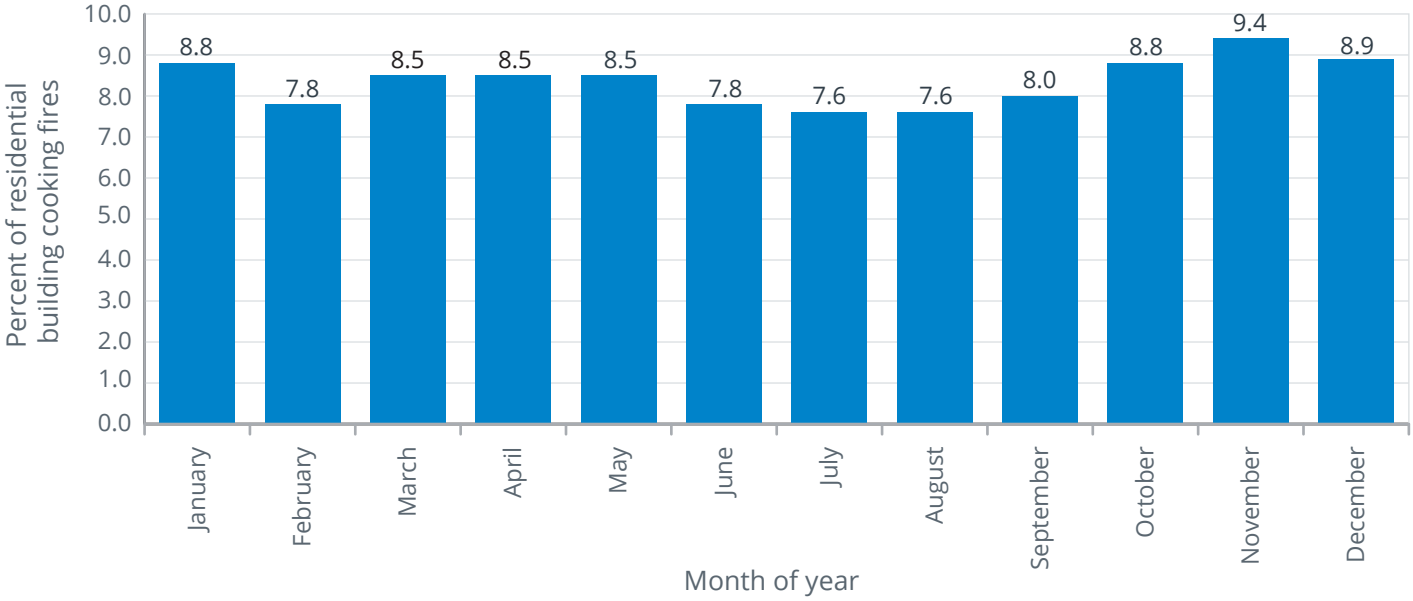
Figure 1. Residential building cooking fires by time of alarm (2014-2016)



Source: NFIRS 5.0.

As expected, residential cooking fires were most prevalent during the months of major holidays, when the cooking of large holiday meals is most common (Figure 2). The incidence of cooking fires peaked in November at over 9 percent. On average, the greatest number of residential cooking fires occurred on Thanksgiving Day, Christmas Day and Christmas Eve, respectively. Fire incidence declined to the lowest point during July and August, corresponding to the assumption that there are decreased cooking activities in residential buildings during the summer. Generally, confined residential cooking fires followed this overall pattern of winter peaks and summer lows, while nonconfined fires were more uniform throughout the year, peaking slightly in January.

Figure 2. Residential building cooking fires by month (2014-2016)

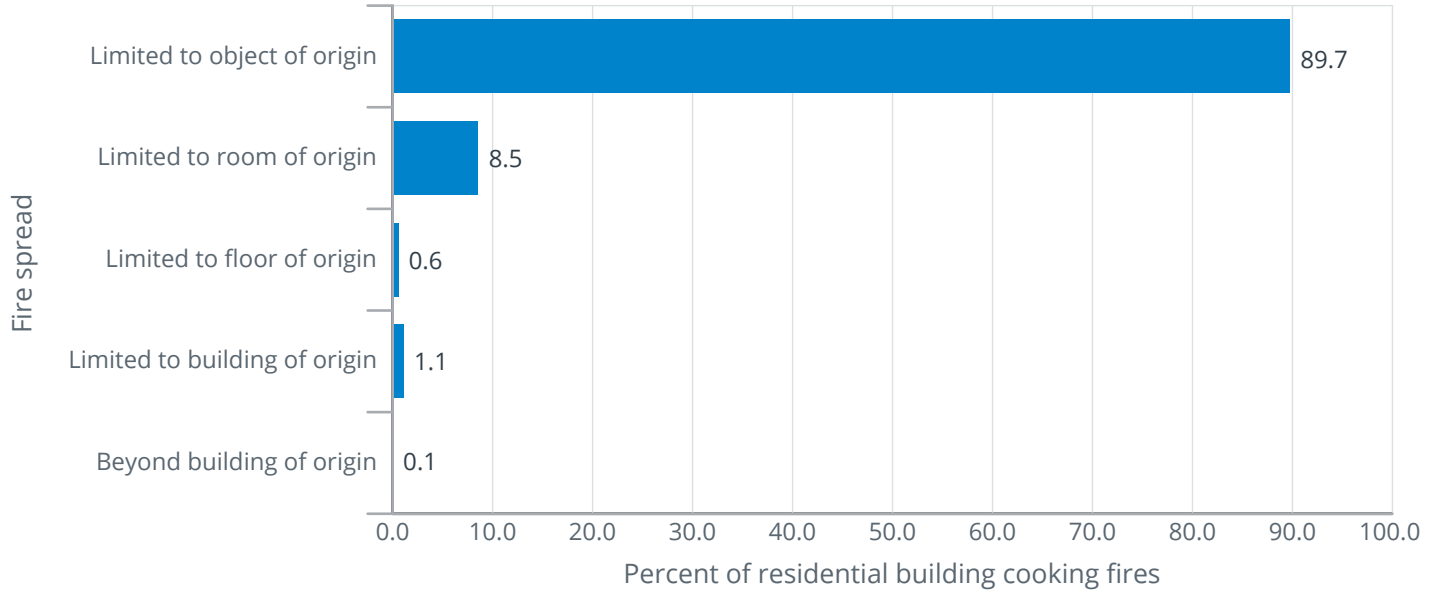


Source: NFIRS 5.0.
Note: Total does not add to 100 percent due to rounding.

Fire spread in residential building cooking fires

As shown in Figure 3, 90 percent of residential cooking fires were limited to the object of origin. An overwhelming majority of these fires were coded as confined fires in NFIRS — 98 percent of residential cooking fires confined to the object of origin were coded as confined fires. Relatively few fires, 2 percent, extended beyond the room of origin.

Figure 3. Extent of fire spread in residential building cooking fires (2014-2016)



Source: NFIRS 5.0.

Confined fires

The NFIRS allows abbreviated reporting for confined fires, and many reporting details of these fires are not required, nor are they reported. (Not all fires limited to the object of origin are counted as confined fires.[13]) Confined residential cooking fires accounted for a large majority (91 percent) of residential cooking fire incidents and dominated the time of alarm profile. The numbers of confined fires were greatest during the hours of 5 to 8 p.m. when they accounted for 91 percent of all residential cooking fires that occurred during this period. Confined residential cooking fires peaked in November, generally declined through May, and were lowest during the summer months of June through August.

Nonconfined fires

The next sections of this topical report address nonconfined residential cooking fires — the larger and more serious fires — where more detailed fire data are available, as they are required to be reported in NFIRS.

Where nonconfined residential building cooking fires start (area of fire origin)

As would be expected, one area in the home — the cooking area or kitchen — accounted for nearly all (94 percent) nonconfined residential cooking fires. Most of the remaining fires occurred in outside areas adjoining residential buildings such as balconies, porches, patios and garages (Table 5).

Note that these areas of origin do not include areas associated with confined residential cooking fires. As cooking was the leading cause of all residential fires at 50 percent, it is not surprising that kitchens were the leading area of fire origin. The percentages were not identical between cooking and kitchen fires because some cooking fires started outside the kitchen, some areas of origin for cooking fires were not reported (as is the case in most confined cooking fires), and some kitchen fires did not start due to cooking. In fact, only 47 percent of nonconfined residential fires that started in the kitchen were cooking fires. Other unspecified, unintentional or careless actions accounted for 14 percent of kitchen fires, and appliances and other heat sources accounted for an additional 16 percent of kitchen fires.

Table 5. Leading areas of fire origin in nonconfined residential building cooking fires (2014-2016)

Area of origin	Percent of nonconfined residential building cooking fires (unknowns apportioned)
Cooking area, kitchen	94.2
Exterior balcony, unenclosed porch	1.5
Courtyard, patio, terrace (includes screened-in porches)	0.9
Vehicle storage area: garage, carport	0.5
Exterior wall surface	0.5

Source: NFIRS 5.0.

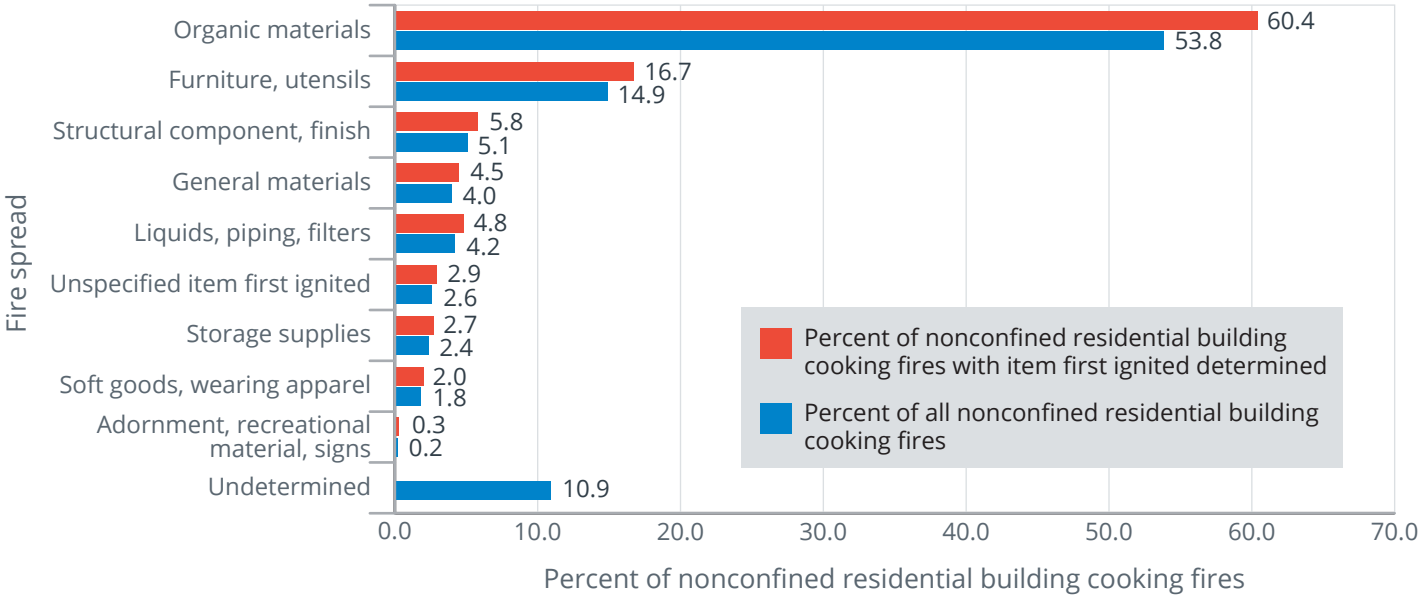
What ignites first in nonconfined residential building cooking fires

Sixty percent of the items first ignited in nonconfined residential cooking fires fell under the "organic materials" category (Figure 4). This category includes cooking materials comprising edible materials for man or animal. The second leading category was "furniture, utensils," a category that includes items such as appliance housings or casings and household utensils, including kitchen and cleaning utensils. "Furniture, utensils" accounted for 17 percent of nonconfined residential cooking fires. At 6 percent, "structural component, finish" was the third leading category of items first ignited.

Cooking materials (60 percent), appliance housing or casing (7 percent), cabinetry (6 percent), and household utensils (4 percent) were the specific items most often first ignited in nonconfined residential cooking fires.

Specifically, oil, fat and grease were the leading types of material ignited in nonconfined residential cooking fires (47 percent). This is not surprising as oil and grease are highly flammable and can splatter or spill during cooking. Plastics (12 percent), such as appliance casings or cooking utensils, and foods or starches (9 percent) were the next most common materials ignited.

Figure 4. Item first ignited in nonconfined residential building cooking fires by major category (2014-2016)



Source: NFIRS 5.0.
Note: Totals do not add to 100 percent due to rounding.

Equipment involved in ignition of nonconfined residential building cooking fires

Three types of equipment played a leading role in the ignition of 86 percent of nonconfined residential cooking fires. These leading types of equipment involved in ignition of nonconfined residential cooking fires, as shown in Table 6, were ranges or kitchen stoves (73 percent), heating stoves (7 percent), and ovens including rotisseries (6 percent).[14] Of interest, microwave ovens were involved in igniting only 4 percent of nonconfined residential cooking fires, and grills or barbecues also accounted for another 4 percent.

Table 6. Leading equipment involved in ignition of nonconfined residential building cooking fires (2014-2016)

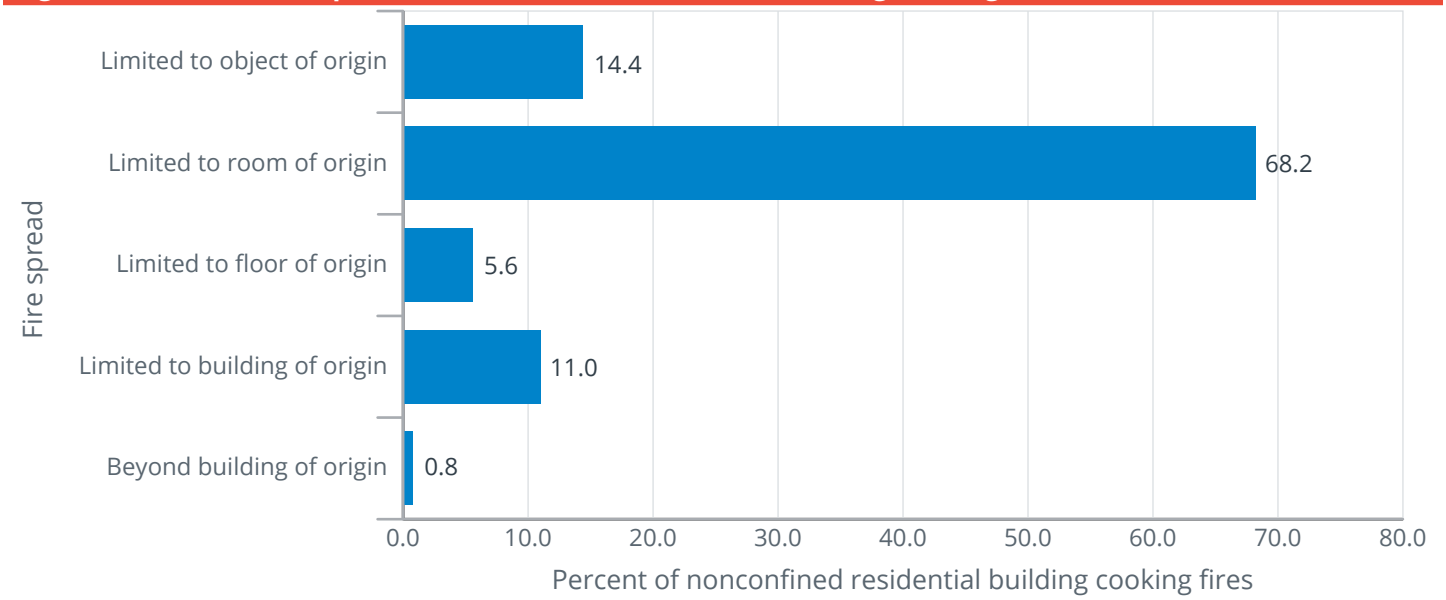
Equipment involved in ignition	Percent of nonconfined residential building cooking fires
Range or kitchen stove	72.9
Heating stove	7.3
Oven, rotisserie	6.2

Source: NFIRS 5.0.

Fire spread in nonconfined residential building cooking fires

The majority of nonconfined residential cooking fires, 83 percent, were limited to the object or room of fire origin (Figure 5). The fire spread profile for nonconfined residential cooking fires was much different than the fire spread profile for all nonconfined residential fires with only 50 percent of these fires being limited to the room or object of origin.

Figure 5. Extent of fire spread in nonconfined residential building cooking fires (2014-2016)



Source: NFIRS 5.0.

Factors contributing to ignition in nonconfined residential building cooking fires

Table 7 shows the categories of factors contributing to ignition for nonconfined residential cooking fires. "Operational deficiency" was the leading category contributing to the ignition of nonconfined residential cooking fires (59 percent). "Misuse of material or product" was the second leading category in 30 percent of residential cooking fires and "electrical failure, malfunction" was the third leading category in 6 percent of the fires. These three categories played a role in 95 percent of nonconfined residential cooking fires.

Careless cooking activities are typically responsible for cooking fires. When a factor was noted as contributing to the ignition of the fire, unattended equipment, such as people leaving food on the stove or in the oven and forgetting about it, accounted for 40 percent of nonconfined residential cooking fires. Unattended equipment was, by far, the leading specific factor contributing to ignition and was three times greater than the second leading specific factor, heat source too close to combustibles (12 percent).

Table 7. Factors contributing to ignition for nonconfined residential building cooking fires by major category (where factors contributing to ignition were specified, 2014-2016)

Factor contributing to ignition category	Percent of nonconfined residential building cooking fires (unknowns apportioned)
Operational deficiency	58.6
Misuse of material or product	30.2
Electrical failure, malfunction	6.1
Mechanical failure, malfunction	4.4
Other factors contributing to ignition	3.6
Fire spread or control	1.1
Design, manufacture, installation deficiency	0.5
Natural condition	0.3

Source: NFIRS 5.0.
Notes: 1. Includes only incidents where factors that contributed to the ignition of the fire were specified.
2. Multiple factors contributing to fire ignition may be noted for each incident; total will exceed 100 percent.

Alerting/Suppression systems in residential building cooking fires

Fire fatalities and injuries have declined over the last 35 years, partly due to new technologies to detect and extinguish fires. Smoke alarms are present in most homes. In addition, the use of residential sprinklers is widely supported by the fire service and is gaining support within residential communities.

Smoke alarm data is available for both confined and nonconfined fires, although for confined fires, the data is very limited in scope. Since different levels of data are reported on smoke alarms in confined and nonconfined fires, the analyses are performed separately. Note that the data presented in Tables 8 to 10 are the raw counts from the NFIRS data set and are not scaled to national estimates of smoke alarms in residential cooking fires. In addition, the NFIRS does not allow for the determination of the type of smoke alarm (i.e., photoelectric or ionization) or the location of the smoke alarm with respect to the area of fire origin.

Smoke alarms in nonconfined residential building cooking fires

Smoke alarms were reported as present in 66 percent of nonconfined residential cooking fires (Table 8). In 15 percent of nonconfined residential cooking fires, there were no smoke alarms present. In another 18 percent of these fires, firefighters were unable to determine if a smoke alarm was present.[15] Thus, smoke alarms were missing in 15 percent to potentially 34 percent of these fires with the ability to spread and possibly result in fatalities.

Table 8. Presence of smoke alarms in nonconfined residential building cooking fires (2014-2016)

Presence of smoke alarms	Percent
Present	66.3
None present	15.4
Undetermined	18.3
Total	100.0

Source: NFIRS 5.0.

While only 2 percent of all nonconfined residential cooking fires occurred in residential buildings that are **not** currently or routinely occupied, these buildings — which are under construction, undergoing major renovation, vacant and the like — are unlikely to have alerting and suppression systems that are in place and, if in place, that are operational. In fact, only 39 percent of all nonconfined cooking fires in unoccupied residential buildings were reported as having smoke alarms that operated. As a result, the detailed smoke alarm analyses in the next section focus on nonconfined cooking fires in occupied residential buildings only.

Smoke alarms in nonconfined cooking fires in occupied residential buildings

Smoke alarms were reported as present in 67 percent of nonconfined cooking fires in occupied residential buildings (Table 9). In 15 percent of nonconfined cooking fires in occupied residential buildings, there were no smoke alarms present. In another 18 percent of these fires, firefighters were unable to determine if a smoke alarm was present; unfortunately, in 19 percent of the fires where the presence of a smoke alarm was undetermined, either the flames involved the building of origin or spread beyond it. Since the fires were so large and destructive, it is unlikely the presence of a smoke alarm could be determined.

When smoke alarms were present (67 percent) and the alarm's operational status is considered, the percentage of smoke alarms reported as present consisted of:

- Present and operated — 47 percent.
- Present but did not operate — 12 percent (alarm failed to operate, 8 percent; fire too small, 4 percent).
- Present but operational status unknown — 8 percent.

When the subset of incidents where smoke alarms were reported as present was analyzed separately as a whole, smoke alarms were reported to have operated in 70 percent of the incidents and failed to operate in 12 percent. In another 6 percent of this subset, the fire was too small to activate the alarm. The operational status of the alarm was undetermined in 11 percent of these incidents.[16]

If a fire occurs, properly installed and maintained smoke alarms provide an early warning signal to everyone in a home. Smoke alarms help save lives and property. The USFA continues to partner with other government agencies and fire service organizations to improve and develop new smoke alarm technologies. More information on smoke alarm technologies, performance, disposal and storage, training bulletins, and public education and outreach materials can be found at https://www.usfa.fema.gov/prevention/technology/smoke_fire_alarms.html. Additionally, the USFA's position statement on smoke alarms is available at https://www.usfa.fema.gov/about/smoke_alarms_position.html.

Table 9. NFIRS smoke alarm data for nonconfined cooking fires in occupied residential buildings (2014-2016)

Presence of smoke alarms	Smoke alarm operational status	Smoke alarm effectiveness	Count	Percent
Present	Fire too small to activate smoke alarm		1,283	4.2
	Smoke alarm operated	Smoke alarm alerted occupants, occupants responded	11,329	36.9
		Smoke alarm alerted occupants, occupants failed to respond	513	1.7
		No occupants	1,197	3.9
		Smoke alarm failed to alert occupants	234	0.8
		Undetermined	1,072	3.5
	Smoke alarm failed to operate		2,529	8.2
	Undetermined		2,305	7.5
None present			4,675	15.2
Undetermined			5,594	18.2
Total reported incidents			30,731	100.0

Source: NFIRS 5.0.

Note: The data presented in this table are raw data counts from the NFIRS data set summed (not averaged) from 2014 to 2016. They do not represent national estimates of smoke alarms in nonconfined residential building cooking fires. They are presented for informational purposes. Total does not add to 100 percent due to rounding.

Smoke alarms in confined residential building cooking fires

Less information about smoke alarm status is collected for confined fires, but the data still give important insights about the effectiveness of alerting occupants in these types of fires. It is especially important to look at the limited information provided for these fires since a large majority (91 percent) of residential cooking fires were confined fires. The analyses presented here do not differentiate between occupied and unoccupied residential buildings, as this data detail is not required when reporting confined fires in the NFIRS. However, an assumption may be made that confined fires are fires in occupied housing, as these types of fires are unlikely to be reported in residential buildings that are not occupied.

Smoke alarms alerted occupants in 54 percent of the reported confined residential cooking fires (Table 10). In other words, residents received a warning from a smoke alarm in more than half of these fires. The data suggest that smoke alarms may alert residents to confined fires, as the early alerting allowed the occupants to extinguish the fires, or the fires self-extinguished. If this is the case, it is an example of the contribution to overall safety and the ability to rapidly respond to fires in early stages that smoke alarms afford. Details on smoke alarm effectiveness for confined fires are needed to pursue this analysis further.

Occupants were not alerted by smoke alarms in 14 percent of the confined fires.[17] In 32 percent of these confined fires, the smoke alarm effectiveness was unknown.

Table 10. NFIRS smoke alarm data for confined residential building cooking fires (2014-2016)

Smoke alarm effectiveness	Count	Percent
Smoke alarm alerted occupants	163,474	53.9
Smoke alarm did not alert occupants	42,907	14.2
Unknown	96,675	31.9
Total reported incidents	303,056	100.0

Source: NFIRS 5.0.

Note: The data presented in this table are raw data counts from the NFIRS data set summed (not averaged) from 2014 to 2016. They do not represent national estimates of smoke alarms in confined residential building cooking fires. They are presented for informational purposes.

Automatic extinguishing systems in nonconfined cooking fires in occupied residential buildings

AES data is available for both confined and nonconfined fires, although for confined fires, the data are also very limited in scope. In confined residential building fires, an AES was present in 1 percent of reported incidents.[18] In addition, the following AES analyses focus on nonconfined cooking fires in occupied residential buildings only, as even fewer AESs are present in unoccupied housing (occupied housing accounted for 98 percent of reported nonconfined residential cooking incidents with full AESs).

Residential sprinklers are the primary AES in residences but are not yet widely installed. In fact, AESs were reported as present in only 8 percent of nonconfined cooking fires in occupied residential buildings (Table 11).

Table 11. NFIRS automatic extinguishing system data for nonconfined cooking fires in occupied residential buildings (2014-2016)

AES presence	Count	Percent
AES present	2,457	8.0
Partial system present	139	0.5
AES not present	27,230	88.6
Unknown	905	2.9
Total reported incidents	30,731	100.0

Source: NFIRS 5.0.

Note: The data presented in this table are raw data counts from the NFIRS data set summed (not averaged) from 2014 to 2016. They do not represent national estimates of AESs in nonconfined cooking fires in occupied residential buildings. They are presented for informational purposes.

Residential sprinkler systems help to reduce the risk of deaths and injuries, homeowner insurance premiums, and uninsured property losses. Despite these advantages, many homes do not have AESs, although they are often found in hotels and businesses. Sprinklers are required by code in hotels and many multifamily residences. There are major movements in the U.S. fire service to require sprinklers in all new homes. At present, however, they are largely absent in residences nationwide.[19]

The USFA and fire service officials across the nation are working to promote and advance residential fire sprinklers. More information on costs and benefits, performance, training bulletins, and public education and outreach materials regarding residential sprinklers is available at https://www.usfa.fema.gov/prevention/technology/home_fire_sprinklers.html. Additionally, the USFA's position statement on residential sprinklers is available at https://www.usfa.fema.gov/about/sprinklers_position.html.

Examples

The following are recent examples of residential cooking fires reported by the media:

- July 2016: Firefighters were called to a cooking fire at a North Knoxville, Tennessee, apartment where they found that a woman had attempted to cook a brisket over an open flame in the fiberglass bathtub of the bathroom. The occupant lit a small, wood-burning grill inside the bathtub, with the meat placed on a wire rack across the rim of the tub. The fiberglass underneath the rack melted as a result of the heat from the grill. Firefighters turned on the shower to extinguish the fire. No injuries were reported but the tub and brisket were a total loss. Additionally, the apartment below suffered minor water damage. The fire captain noted that this was the first time the department responded to a call of this nature as most documented cooking fires occur in the kitchen.[20]
- January 2017: An unattended cooking fire in a single-family residence in Akron, Ohio, caused the deaths of a man, a woman and their two daughters. Another woman living in the home escaped from the attic and survived. The fire broke out around 1:30 a.m. Inspection of the interior revealed heavy damage to the first-floor kitchen near a gas stove. Evidence showed that one stove burner was in the 'on' position. After the fire was extinguished, firefighters were unable to determine if smoke alarms were present in the home. A city ordinance requires landlords to install working smoke alarms in properties.[21]

- December 2016: An unattended stove caused a fire that damaged a townhouse and displaced a family in Forks Township, Pennsylvania. Firefighters were called to the scene shortly after 12:30 p.m. where they found a kitchen fire. No one was home when fire crews arrived, but a pot was found cooking on the stove. Firefighters extinguished the flames quickly and contained the fire to the kitchen, but the rest of the townhouse received considerable smoke damage. There were no reported injuries, and none of the adjacent homes were damaged.[22]

For home cooking fire prevention tips and information, visit the USFA's cooking fire safety outreach materials webpage at https://www.usfa.fema.gov/prevention/outreach/cooking.html.

NFIRS data specifications for residential building cooking fires

Data for this report were extracted from the NFIRS annual Public Data Release files for 2014, 2015 and 2016. Only Version 5.0 data were extracted.

Residential building cooking fires were defined using the following criteria:

- Aid Types 3 (mutual aid given) and 4 (automatic aid given) were excluded to avoid counting a single incident more than once.
- Incident Types 111, 113, 118, 120 to 123:[23]

Incident Type	Description
111	Building fire
113	Cooking fire, confined to container
118	Trash or rubbish fire, contained
120	Fire in mobile property used as a fixed structure, other
121	Fire in mobile home used as fixed residence
122	Fire in motor home, camper, recreational vehicle
123	Fire in portable building, fixed location

Note: Incident Types 113 and 118 do not specify if the structure is a building.

- Property Use Series 400, which consists of the following:

Property Use	Description
400	Residential, other
419	One- or two-family dwelling, detached, manufactured home not in transit, duplex
429	Multifamily dwelling
439	Boarding/Rooming house, residential hotels
449	Hotel/Motel, commercial
459	Residential board and care
460	Dormitory-type residence, other
462	Sorority house, fraternity house
464	Barracks, dormitory

- Structure Type:
  - For Incident Types 113 and 118:
    - 1—Enclosed building, or
    - 2—Fixed portable or mobile structure, or
    - Structure Type not specified (null entry).
  - For Incident Types 111 and 120 to 123:
    - 1—Enclosed building, or
    - 2—Fixed portable or mobile structure.
- The USFA Structure Fire Cause Methodology was used to determine residential building cooking fire incidents (i.e., cause code = '05').[24]
- Heating fire incidents involving heating stoves and food were believed to be cooking fires. As a result, fires with equipment involved in ignition code 124 (stove, heating) and item first ignited code 76 (cooking materials; includes edible materials for man or animal; excludes cooking utensils) were included in this analysis.

The analyses contained in this report reflect the current methodologies used by the USFA. The USFA is committed to providing the best and most current information on the U.S. fire problem and continually examines its data and methodology to fulfill this goal. Because of this commitment, data collection strategies and methodological changes are possible and do occur. As a result, analyses and estimates of the fire problem may change slightly over time. Previous analyses and estimates on specific issues (or similar issues) may have used different methodologies or data definitions and may not be directly comparable to the current ones.

Information regarding the USFA's national estimates for residential building fires, as well as the data sources used to derive the estimates, can be found in the document "Data Sources and National Estimates Methodology Overview for the U.S. Fire Administration's Topical Fire Report Series (Volume 19)," http://www.usfa.fema.gov/downloads/pdf/statistics/data_sources_and_national_estimates_methodology_vol19.pdf. This document also addresses the specific NFIRS data elements analyzed in the topical reports, as well as "unknown" data entries and missing data.

To request additional information, visit http://www.usfa.fema.gov/contact.html. Provide feedback on this report.

Notes:

[1]National estimates are based on 2014-2016 native Version 5.0 data from the National Fire Incident Reporting System (NFIRS), residential structure fire loss estimates from the National Fire Protection Association's (NFPA's) annual surveys of fire loss, and the U.S. Fire Administration's (USFA's) residential buildings fire loss estimates: https://www.usfa.fema.gov/data/statistics/order_download_data.html. Further information on the USFA's residential building fire loss estimates can be found in the "National Estimates Methodology for Building Fires and Losses," August 2012, https://www.usfa.fema.gov/downloads/pdf/statistics/national_estimate_methodology.pdf. For information on the NFPA's survey methodology, see the NFPA's report "Fire Loss in the United States During 2016," September 2017, https://www.nfpa.org/news-and-research/fire-statistics-and-reports/fire-statistics/fires-in-the-us/overall-fire-problem/fire-loss-in-the-united-states. In this topical report, fires are rounded to the nearest 100, deaths to the nearest five, injuries to the nearest 25, and loss to the nearest million dollars. Additionally, deaths and injuries refer to civilian casualties only and do not include firefighters who die or are injured as a result of a fire.

[2]In NFIRS Version 5.0, a structure is a constructed item of which a building is one type. In previous versions of the NFIRS, the term "residential structure" commonly referred to buildings where people live. To coincide with this concept, the definition of a residential structure fire for the NFIRS 5.0 includes only those fires where the NFIRS 5.0 Structure Type is 1 or 2 (enclosed building and fixed portable or mobile structure) with a residential property use. Such structures are referred to as "residential buildings" to distinguish these buildings from other structures on residential properties that may include fences, sheds and other uninhabitable structures. In addition, confined fire incidents that have a residential property use, but do not have a structure type specified, are presumed to occur in buildings. Nonconfined fire incidents that have a residential property use without a structure type specified are considered to be invalid incidents (Structure Type is a required field) and are not included.

[3]The term "residential buildings" includes what are commonly referred to as "homes," whether they are one- or two-family dwellings or multifamily buildings. It also includes manufactured housing, hotels and motels, residential hotels, dormitories, assisted living facilities, and halfway houses — residences for formerly institutionalized individuals (patients with mental disabilities, drug addicts, or those formerly incarcerated) that are designed to facilitate their readjustment to private life. The term "residential buildings" does not include institutions such as prisons, nursing homes, juvenile care facilities, or hospitals, even though people may reside in these facilities for short or long periods of time.

[4]For purposes of this analysis, residential building cooking fires are defined as those residential buildings (defined above) for which the cause of the fire was determined to be cooking. However, for the confined fire portion of residential building fires, only those with Incident Types 113 and 118 were included; all other confined fire types were excluded.
[5]USFA Fire Estimate Summary, Residential Building Fire Causes (2007-2016), May 2018, https://www.usfa.fema.gov/downloads/pdf/statistics/res_bldg_fire_estimates.pdf.
[6]USFA Fire Estimate Summary, Residential Building Fire Injury Causes (2007-2016), May 2018, https://www.usfa.fema.gov/downloads/pdf/statistics/res_bldg_fire_estimates.pdf.
[7]Fire department participation in the NFIRS is voluntary; however, some states do require their departments to participate in the state system. Additionally, if a fire department is a recipient of a Fire Act Grant, participation is required. From 2014 to 2016, 68 percent of the NFPA's annual average estimated 1,328,500 fires to which fire departments responded were captured in the NFIRS. Thus, the NFIRS is not representative of all fire incidents in the U.S. and is not a "complete" census of fire incidents. Although the NFIRS does not represent 100 percent of the incidents reported to fire departments each year, the enormous dataset exhibits stability from one year to the next without radical changes. Results based on the full dataset are generally similar to those based on part of the data.
[8]In the NFIRS, confined fires are defined by Incident Type Codes 113 to 118.
[9]The NFIRS distinguishes between "content" and "property" loss. Content loss includes losses to the contents of a structure due to damage by fire, smoke, water and overhaul. Property loss includes losses to the structure itself or to the property itself. Total loss is the sum of the content loss and the property loss. For confined fires, the expectation is that the fire did not spread beyond the container (or rubbish for Incident Type Code 118), and hence, there was no property damage (damage to the structure itself) from the flames. However, there could be property damage as a result of smoke, water and overhaul.
[10]The average fire death and fire injury loss rates computed from the national estimates do not agree with average fire death and fire injury loss rates computed from NFIRS data alone. The fire death rate computed from national estimates is (1,000 x (195/188,800)) = 1.0 deaths per 1,000 residential building cooking fires, and the fire injury rate is (1,000 x (3,800/188,800)) = 20.1 injuries per 1,000 residential building cooking fires.
[11]"One- and two-family residential buildings" include detached dwellings, manufactured homes, mobile homes not in transit, and duplexes. "Multifamily residential buildings" include apartments, town houses, row houses, condominiums and other tenement properties. "Other residential buildings" include boarding/rooming houses, hotels/motels, residential board and care facilities, dormitory-type residences, sorority/fraternity houses, and barracks.
[12]For the purposes of this report, the time of the fire alarm is used as an approximation for the general time at which the fire started. However, in the NFIRS, it is the time at which the fire was reported to the fire department.
[13]As noted previously, confined building fires are small fire incidents that are limited in scope, are confined to noncombustible containers, rarely result in serious injury or large content loss, and are expected to have no significant accompanying property loss due to flame damage. In the NFIRS, confined fires are defined by Incident Type Codes 113 to 118.
[14]In the NFIRS, the term "heating stove" refers to heating equipment and is generally classified as a heating cause; however, for some cooking fire incidents, it was determined that the "Equipment Involved in Ignition" data element was coded erroneously as a "heating stove" rather than a "range or kitchen stove." For all of these incidents, the "Item First Ignited" data element was coded as cooking materials. Additionally, 99 percent of the "heating stove" fires occurred in the kitchen.
[15]Total does not add to 100 percent due to rounding.
[16]Total does not add to 100 percent due to rounding.
[17]In confined fires, the entry "smoke alarm did not alert occupants" can mean no smoke alarm was present; the smoke alarm was present but did not operate; the smoke alarm was present and operated, but the occupant(s) was already aware of the fire; or there were no occupants present at the time of the fire.
[18]As confined fires codes are designed to capture fires contained to noncombustible containers, it is not recommended to code a fire incident as a small-, low- or no-loss confined fire incident if the AES operated and contained the fire as a result. The preferred method is to code the fire as a standard fire incident with fire spread confined to the object of origin and provide the relevant information on AES presence and operation.
[19]U.S. Department of Housing and Urban Development and U.S. Census Bureau, American Housing Survey for the United States: 2011, September 2013, "Health and Safety Characteristics-All Occupied Units (National)," Table S-01-AO, https://www.census.gov/content/dam/Census/programs-surveys/ahs/data/2011/h150-11.pdf (accessed October 23, 2018).
[20]News Sentinel Staff, "Knoxville woman cooking brisket in bathtub starts fire," knoxnews.com, July 13, 2016, http://archive.knoxnews.com/news/local/kfd-woman-cooking-brisket-in-bathtub-starts-fire-378604e4-2af7-35a8-e053-0100007f31f5-386654351.html/ (accessed October 16, 2018).
[21]Bob Jones, "Investigator: Unattended cooking cause of Akron house fire that killed four," news5cleveland.com, January 20, 2017, https://www.news5cleveland.com/news/local-news/oh-summit/investigator-unattended-cooking-cause-of-akron-house-fire-that-killed-four (accessed October 16, 2018).
[22]Jim Deegan, "Forks Twp. fire caused by unattended cooking, chief says," lehighvalleylive.com, December 3, 2016, https://www.lehighvalleylive.com/easton/index.ssf/2016/12/forks_twp_fire_caused_by_unatt.html (accessed October 16, 2018).
[23]Incident Types: 114, 115, 116 and 117 were excluded because, by definition, these Incident Types are not cooking fires.
[24]The USFA Structure Fire Cause Methodology was used to identify fires for which the cause was cooking. The cause methodology and definitions can be found in the document "National Fire Incident Reporting System Version 5.0 Fire Data Analysis Guidelines and Issues," July 2011, http://www.usfa.fema.gov/downloads/pdf/nfirs/nfirs_data_analysis_guidelines_issues.pdf.